

CLAIMS

What is claimed is:

- 1 1. A service valve assembly, for a split air-conditioning and heat pump system, said
2 assembly comprising:
3 a service valve block having a plurality of interconnected side surfaces, a first
4 cavity, a first set of orifices in parallel opposed side surfaces of said service block and
5 perpendicular to said first cavity, a second cavity, a second set of orifices in parallel
6 opposed side surfaces of said service block and perpendicular to said second cavity;
7 a first valve, operatively positioned within said first cavity, including a first set of
8 passages having a first main passage extending through said first valve from an inlet
9 located at a first one of said first set of orifices to an outlet located at a second one of said
10 first set of orifices, and a first minor passage extending from a third one of said first set of
11 orifices to said main passage, with said first valve serving to direct a refrigerant medium
12 through said first set of passages; and
13 a second valve, operatively positioned within said second cavity, including a
14 second set of passages having a second main passage extending through said second
15 valve from an inlet located at a first one of said second set of orifices to an outlet located
16 at a second one of said second set of orifices, and a second minor passage extending from
17 a third one of said second set of orifices, with said second valve serving to direct said
18 refrigerant medium through said second set of passages.
- 1 2. A service valve assembly, for a split air-conditioning and heat pump system, said
2 assembly comprising:
3 a multi-sided service valve block having:
4 a first axial end;

a second axial end;
a first set of orifices and a first cavity located at said first axial end;
a second set of orifices and a second cavity, located at said second axial end;
a first side surface, at said first axial end, having a first side surface orifice and a first valve holding passage extending axially inwardly therefrom;
a second side surface, extending from said first axial end to said second axial end, located perpendicular to said first side surface, having a plurality of bores for receiving fasteners;
a third side surface located perpendicular to said first and second side surfaces, having a liquid refrigerant inlet orifice and a gaseous refrigerant outlet orifice located therein;
a fourth side surface located perpendicular to said first and third side surfaces, having a liquid charge port orifice and a gaseous charge port orifice located therein;
a fifth side surface located perpendicular to said first, second and fourth side surfaces, having a liquid refrigerant outlet orifice and a gaseous refrigerant inlet orifice located therein; and
a sixth side surface located at said second axial end, located perpendicular to said second, third, fourth, and fifth side surfaces, having a second side surface orifice therein, and a second valve holding passage extending axially inwardly therefrom;
a first valve body operatively positioned within said first valve holding passage, including a first set of passages having:
a main liquid refrigerant passage radially extending through said first valve body from said liquid refrigerant inlet orifice to said liquid refrigerant outlet orifice; and
a first minor charge passage, perpendicular to said main liquid refrigerant passage, extending from said liquid charge port orifice

34 to said main liquid refrigerant passage; said first set of passages
 35 controlling the flow of liquid refrigerant within said main liquid
 36 refrigerant passage and said first minor charge passage; and
 37 a second valve body, operatively positioned within said second valve
 38 holding passage, including a second set of passages having:
 39 a main gaseous refrigerant passage radially extending through said
 40 second valve body from said gaseous refrigerant inlet orifice to
 41 said gaseous refrigerant outlet orifice; and
 42 a second minor charge passage, perpendicular to said main gaseous
 43 refrigerant passage, extending from said gaseous charge port
 44 orifice to said main gaseous refrigerant passage, said second set of
 45 passages controlling the flow of gaseous refrigerant within said
 46 main gaseous refrigerant passage and said second minor charge
 47 passage.

1 3. The service valve assembly as in claim 2 wherein said main liquid refrigerant
 2 passage extends linearly through said service valve block.

1 4. The service valve assembly as in claim 2 wherein both said main liquid refrigerant
 2 passage and said main gaseous refrigerant passage extend linearly through said service
 3 valve block.

1 5. A service valve assembly, for use in a split air conditioning/heat pump system,
 2 said assembly comprising:

3 a valve block having a plurality of passages;
 4 a first cavity including a first valve holding passage, for conducting gaseous
 5 refrigerant within said block;
 6 a first valve, operatively positioned within said first valve holding passage,
 7 including a first through passage radially extending both through said first valve

8 as well as from an outer surface of a first side of said block to an outer surface of a
9 side opposite said first side;
10 a first charging passage extending from said valve block outer surface to said first
11 through passage;
12 a second cavity, including a second valve holding passage, for conducting liquid
13 refrigerant within said block;
14 a second valve, operatively interposed within said second valve holding passage
15 including a second through passage extending both through said second valve as
16 well as from the outer surface of said valve block first side to the outer surface of
17 said opposite side;
18 a second charging passage extending from said valve block outer surface to said
19 second through passage;
20 said first valve being adapted for receiving and fluidly communicating said
21 gaseous refrigerant between said first through passage and said first charging
22 passage; and
23 said second valve being adapted for receiving and fluidly communicating said
24 liquid refrigerant between said second through passage and said second charging
25 passage.

- 1 6. The service valve assembly as in claim 5 further comprising:
2 a first indoor unit port connected to a first end of said first through passage;
3 a first outdoor unit port connected to a second end of said first through passage;
4 a first service port connected to said first charging passage;
5 a first valve actuation port connected to said first valve holding passage;
6 a second outdoor unit port connected to a first end of said second through passage;
7 a second indoor unit port connected to a second end of said second through
8 passage;
9 a second service port connected to said second charging passage; and
10 a second valve actuation port connected to said second valve holding passage.

- 1 7. The service valve assembly as in claim 6 further comprising:
2 a first charging port cap for covering said first service port;
3 a second charging port cap for covering said second service port;
4 a first valve cap for covering said first valve actuation port; and
5 a second valve cap for covering said second valve actuation port.
- 1 8. The service valve assembly as in claim 6 wherein said first and said second valve
2 actuation ports are formed integrally with said valve block.
- 1 9. The service valve assembly as in claim 5 wherein said first through passage, said
2 first valve holding passage, said second through passage, and said second valve holding
3 passage are circular in cross section and of differing diametral extents.
- 1 10. The service valve assembly as in claim 5 wherein said first charging passage and
2 said first valve holding passage are oriented perpendicularly relative to said first through
3 passage.
- 1 11. The service valve assembly as in claim 5 wherein said second charging passage
2 and said second valve holding passage are oriented perpendicularly relative to said second
3 through passage.
- 1 12. The service valve assembly as in claim 5 wherein said valve block has a surface
2 with at least one recess for receiving a fastening member for securing said assembly onto
3 a component of said system.
- 1 13. The service valve assembly as in claim 5 wherein said first through passage is
2 linear.

1 14. The service valve assembly as in claim 5 wherein said second through passage is
2 linear.

1 15. The service valve assembly as in claim 5 wherein said first and said second
2 through passages are both linear.

1 16. The service valve assembly as in claim 5 wherein said first valve has at least one
2 seal for retaining gaseous refrigerant within said first plurality of passages.

1 17. The service valve assembly as in claim 16 wherein said at least one seal is
2 comprised of an elastomeric material.

1 18. The service valve assembly as in claim 5 wherein said first valve is a plug valve.

1 19. The service valve assembly as in claim 18 wherein said plug valve is comprised of
2 a plug body capable of housing a series of removable stems having through holes of
3 varying diameters.

1 20. The service valve assembly as in claim 18 wherein said plug valve has a seal for
2 retaining refrigerant within said first through passage.

1 21. The service valve assembly as in claim 18 wherein said plug valve has an isolated
2 charge port.

1 22. The service valve assembly as in claim 5 wherein said first and second valves are
2 both plug valves.

1 23. The service valve assembly as in claim 22 wherein said first and second plug
2 valves are of different sizes.

1 24. The service valve assembly as in claim 22 wherein each of said plug valves has a
2 valve stem which can be replaced with a substitute valve stem having an alternate sized
3 through passage.

1 25. The service valve assembly as in claim 22 wherein each of said plug valves has an
2 isolated charge port.

1 26. The service valve assembly as in claim 5 wherein said first valve is a plug valve
2 and said second valve is a front seat valve.

1 27. An improved service valve block, for use in a split air conditioning/heat pump
2 system, comprising:

3 a first cavity defining a first plurality of interconnected passages for conducting
4 gaseous refrigerant within said block including:

5 a first through passage radially extending from an outer surface of a first
6 side of said block to an outer surface of a side opposite said first side;

7 a first charging passage extending from said valve block outer surface to
8 said first through passage; and

9 a first valve holding passage extending from said valve block outer surface
10 to said first through passage; and

11 a second cavity, defining a second plurality of interconnected passages for
12 conducting liquid refrigerant within said block, including:

13 a second through passage radially extending from said outer surface of
14 said block first side to said outer surface of said opposite side;

15 a second charging passage extending from said valve block outer surface
16 to said second through passage; and

17 a second valve holding passage extending from said valve block outer
18 surface to said second through passage.

1 28. A service valve assembly, for use in a split air conditioning/heat pump system,
2 said assembly comprising:
3 a valve block having:
4 a first cavity defining a first plurality of interconnected passages for
5 conducting gaseous refrigerant within said block including:
6 a first through passage radially extending from an outer surface of
7 a first side of said block to an outer surface of a side opposite said
8 first side;
9 a first charging passage extending from said valve block outer
10 surface to said first through passage; and
11 a first valve holding passage extending from said valve block outer
12 surface to said first through passage;
13 a second cavity defining a second plurality of interconnected passages for
14 conducting liquid refrigerant within said block including:
15 a second through passage extending from an outer surface of said
16 valve block first side to said outer surface of said opposite side;
17 a second charging passage extending from said valve block outer
18 surface to said second through passage; and
19 a second valve holding passage extending from said valve block
20 outer surface to said second through passage;
21 a first valve operatively positioned within said first valve holding passage,
22 including a through passage radially extending through said first valve being adapted for
23 receiving and fluidly communicating said gaseous refrigerant between said first through
24 passage and said first charging passage; and
25 a second valve operatively interposed within said second valve holding passage
26 including a second through passage extending through said second valve being adapted
27 for receiving and fluidly communicating said liquid refrigerant between said second
28 through passage and said second charging passage.

1 29. The service valve assembly as in claim 28 wherein a first valve actuation port
2 connected to said first valve holding passage is integral with said valve block and a
3 second valve actuation port connected to said second valve holding passage is also
4 integral with said valve block.

1 30. The service valve assembly as in claim 28 wherein said first charging passage and
2 said first valve holding passage are oriented perpendicularly relative to said first through
3 passage.

1 31. The service valve assembly as in claim 28 wherein said second charging passage
2 and said second valve holding passage are oriented perpendicularly relative to said second
3 through passage.

1 32. The service valve assembly as in claim 28 wherein said first through passage is
2 linear.

1 33. The service valve assembly as in claim 28 wherein said second through passage is
2 linear.

1 34. The service valve assembly as in claim 28 wherein said first and said second
2 through passages are both linear.

1 35. The service valve assembly as in claim 28 wherein said first valve is a plug valve.

1 36. The service valve assembly as in claim 28 wherein said first and second valves are
2 both plug valves.